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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,202	01/22/2004	Guping Tang	4249-0115P	2330
2292	7590	11/21/2006		
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
			EXAMINER MAKAR, KIMBERLY A	
			ART UNIT 1636	PAPER NUMBER

DATE MAILED: 11/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/761,202

Applicant(s)

TANG ET AL.

Examiner

Kimberly A. Makar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 30-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/20/05;04/23/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Restriction Election

1. Applicant's election without traverse of group I in the reply filed on 09/20/06 is acknowledged.
2. Claims 30-35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 09/20/06.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 4-7, 16-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claims 4-7, and 20-23 recite a biocompatible copolymer and method of synthesizing said copolymer comprising polyethylenimine of specific molecular weights. However, these molecular weights lack units. Are these units Daltons? Or kiloDaltons? Or some other standard for molecular weight for polymers? The specification also fails to define the units of molecular weight for the polyethylenimine. A skilled artisan would be unable to determine the metes and bounds of the claimed invention as written.
6. Claim 16 recites a method for synthesizing a biodegradable copolymer comprising treating a cyclodextrin to form an activated cyclodextrin, and adding the

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activated cyclodextrin to a low molecular weight polyethylenimine under "suitable conditions" to form a biodegradable copolymer. It is unclear what the "suitable conditions" are in order to form the biodegradable copolymer. The specification fails to disclose a definition for the phrase "suitable conditions." A skilled artisan would be unable to determine the metes and bounds of the claimed invention as written.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-9, 11-12, 16-18, 20-25 and 29 are rejected under 35 U.S.C. 102(b) as being taught by Kosak et al (US Patent Publication No: US2001/0034333). Claims 1-9, 11-12, 16-18, 20-25 and 29 recite a biodegradable copolymer comprising a low molecular weight polyethyleneimine (PEI) cross-linked by a cyclodextrin (claim 1) wherein the biodegradable has a net positive charge and being capable of complexing with negatively charged nucleic acid molecules (claim 2) and wherein the net positive charge is provided by one or more primary, secondary or tertiary amines (claim 3). The

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biodegradable copolymer is further limited wherein the low molecular weight polyethyleneimine has a molecular weight of less than 25,000 (claim 4) or less than 20,000, 15,000, 10,000 and 5,000 (claim 5) or wherein the polyethyleneimine has a molecular weight less than about 2000 (claim 6) wherein the polyethyleneimine has a molecular weight from about 600 to 2000 (claim 7). The copolymer is further limited wherein the cyclodextrin is beta-cyclodextrin modified or activated by an agent to allow attachment to polyethylenimine (claim 8) and wherein the agent is selected from the group consisting of beta-1,1'-carbonyldiimidazole, benzotriazole carbonate, N,N'-disuccinimidyl carbonate, chloroformates, N-hydroxysuccinimidyl chloroformate, and carbonylimidazole (claim 9). The biodegradable copolymer is further limited wherein the polyethylenimine is cross-linked to cyclodextrin via a carbonyl group (claim 11) and has ester bonding (claim 12).

9. Claim 16 recites a method for synthesizing a biodegradable copolymer comprising the steps of treating cyclodextrin with an agent to form a modified or activated cyclodextrin and adding the cyclodextrin to a low molecular weight polyethylenimine to form a biodegradable copolymer. The method is further limited wherein the cyclodextrin is beta-cyclodextrin (claim 17). The method is further limited wherein the agent is selected from the group consisting of beta-1,1'-carbonyldiimidazole, benzotriazole carbonate, N,N'-disuccinimidyl carbonate, chloroformates, N-hydroxysuccinimidyl chloroformate, and carbonylimidazole (claim 18) and the low molecular weight polyethylenimine has a molecular weight of less than about 25,000 (claim 20), or less than 20,000, 15,000, 1,000 and 5,000 (claim 21) or

wherein the polyethylenimine has a molecular weight less than about 2,000 (claim 22) or from about 600 to 2,000 (claim 23). The method is further limited wherein the polyethylenimine is cross-linked to cyclodextrin by a carbonyl group (claim 24) and wherein the copolymer contains ester bonding (claim 25). Claim 29 recites a copolymer synthesized by the method according to claim 16.

10. Kosak et al (US Patent Publication No: US2001/0034333) teaches compositions and methods of making said compositions comprising cyclodextrin polymers for carrying drugs and other active agents (see abstract). Specifically Kosak teaches that the polymer can be heteropolymers (copolymers) comprising a cyclodextrin and a "spacer" (page 8, paragraph 0115). Kosak teaches that the DNA binding substance polyethylenimine (PEI) can be combined into the copolymer (page 4, paragraph 0055), and uses a low molecular weight PEI, with a molecular weight of 800, in a copolymer with cationic cyclodextrin polymers in Preparation XIX on page 24. Kosak teaches that the cyclodextrins used in the copolymers can be beta-cyclodextrin (page 4, paragraph 63), and that the cyclodextrin is treated to become cationic (net positive charge) by the addition of primary, secondary and tertiary amines (page 10, paragraph 0136; page 23, paragraph 0347-0349). Kosak further teaches that the copolymers can be coupled to bioactive agents, particularly DNA (page 3, paragraph 0040). Kosak further teaches that the agent responsible that can provide the bio-compatible linkages for synthesizing the cyclodextrin polymers of the instant invention includes the chloroformate ethyl chloroformate (page 7, paragraph 0106). Furthermore, Kosak teaches that the

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copolymer can be formed via a carbonyl group, and can comprise ester bonds (page 10, paragraph 0136).

11. Kosak also teaches methods of making a biodegradable copolymer by treating cyclodextrin with 1,4 butanediol diglycidyl ether (an agent) to form a modified or activated cyclodextrin and adds the cyclodextrin to a low molecular weight polyethylenimine (see Preparations XVII and XIX on pages 23-24). Kosak teaches that the polymer can be heteropolymers (copolymers) comprising a cyclodextrin and a "spacer" (page 8, paragraph 0115). Kosak teaches that the DNA binding substance polyethylenimine (PEI) can be combined into the copolymer (page 4, paragraph 0055), and uses a low molecular weight PEI, with a molecular weight of 800, in a copolymer with cationic cyclodextrin polymers in Preparation XIX on page 24. Kosak teaches that the cyclodextrins used in the copolymers can be beta-cyclodextrin (page 4, paragraph 63), and that the cyclodextrin is treated to become cationic (net positive charge) by the addition of primary, secondary and tertiary amines (page 10, paragraph 0136, page 23, paragraph 0347-0349). Kosak further teaches that the copolymers can be coupled to bioactive agents, particularly DNA (page 3, paragraph 0040). Kosak further teaches that the agent responsible that can provide the bio-compatible linkages for synthesizing the cyclodextrin polymers of the instant invention includes the chloroformate ethyl chloroformate (page 7, paragraph 0106). Furthermore, Kosak teaches that the copolymer can be formed via a carbonyl group, and can comprise ester bonds (page 10, paragraph 0136). Thus Kosak teaches the claimed invention.

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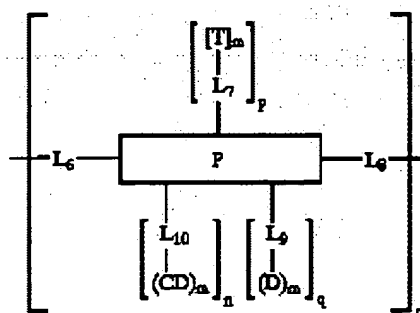
12. Claims 1-4, 8-20, and 24-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Cheng et al (US Patent Publication NO: US2004/0077595). Claims 1-4, 8-20, and 24-29 recite a biodegradable copolymer comprising a low molecular weight polyethyleneimine cross-linked by a cyclodextrin (claim 1) wherein the biodegradable has a net positive charge and being capable of complexing with negatively charged nucleic acid molecules (claim 2) and wherein the net positive charge is provided by one or more primary, secondary or tertiary amines (claim 3). The biodegradable copolymer is further limited wherein the low molecular weight polyethyleneimine has a molecular weight of less than 25,000 (claim 4). The copolymer is further limited wherein the cyclodextrin is beta-cyclodextrin modified or activated by an agent to allow attachment to polyethylenimine (claim 8) and wherein the agent is selected from the group consisting of beta-1,1'-carbonyldiimidazole, benzotriazole carbonate, N,N'-disuccinimidyl carbonate, chloroformates, N-hydroxysuccinimidyl chloroformate, and carbonylimidazole (claim 9) or beta-1,1'-carbonyldiimidazole (claim 10). The biodegradable copolymer is further limited wherein the polyethylenimine is cross-linked to cyclodextrin via a carbonyl group (claim 11) and has ester bonding (claim 12). The biodegradable copolymer is further limited wherein the copolymer contains up to about 35 PEI units (claim 13) between 5 and 25 PEI units (claim 14), or between 10 to 15 PEI units (claim 15).

13. Claim 16 recites a method for synthesizing a biodegradable copolymer comprising the steps of treating cyclodextrin with an agent to form a modified or activated cyclodextrin and adding the cyclodextrin to a low molecular weight

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polyethylenimine to form a biodegradable copolymer. The method is further limited wherein the cyclodextrin is beta-cyclodextrin (claim 17). The method is further limited wherein the agent is selected from the group consisting of beta-1,1'-carbonyldiimidazole, benzotriazole carbonate, N,N'-disuccinimidyl carbonate, chloroformates, N-hydroxysuccinimidyl chloroformate, and carbonylimidazole (claim 18) or beta-1,1'-carbonyldiimidazole (claim 19) and the low molecular weight polyethylenimine has a molecular weight of less than about 25000 (claim 20). The method is further limited wherein the polyethylenimine is cross-linked to cyclodextrin by a carbonyl group (claim 24) and wherein the copolymer contains ester bonding (claim 25). The method is further limited wherein the copolymer contains up to about 35 PEI units (claim 26) or about 5 and 25 PEI units (claim 27) or about 10 to 15 PEI units (claim 28). Claim 29 recites a copolymer synthesized by the method according to claim 16.

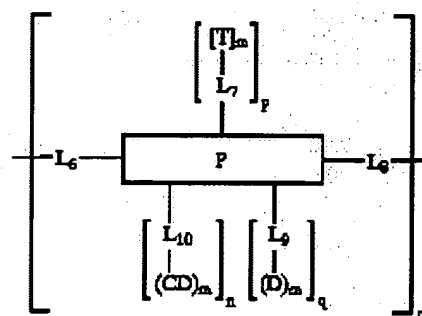
14. Cheng et al (US Patent Publication No: US2004/0077595) teaches compositions and methods of making said compositions comprising cyclodextrin polymers for carrying drugs and other active agents (see abstract). Specifically Cheng teaches copolymers comprising the formula II according to claim 3 wherein CD is a cyclodextrin, P is a monomer unit of a polymer, and D represents a therapeutic agent:



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15. Cheng teaches that the polymer can be polyethylenimine with a molecular weight of 25,000 (example 25), and that the copolymer (o) of formula II comprises 1-30,000 polymer units (claim 3). Cheng teaches that the cyclodextrin is beta-cyclodextrin (page 6, paragraph 0082) and is modified to allow conjugation (paragraph 0083). Cheng teaches that the copolymer can be treated with carbonyldiimidazole (beta-1,1'-carbonyldiimidazole) in order to add amine groups (page 30, paragraph 0309) which would result in a net positive charge. Cheng further teaches that the copolymer is conjugated via a carbonyl group (page 9, paragraph 0112), and the copolymer comprises ester bonds (claim 11). Furthermore, Cheng teaches that the copolymer compound comprises therapeutic agents such as nucleic acids (page 7, paragraph 0094).

16. Cheng teaches methods of making the copolymer by treating cyclodextrin with an agent to form a modified or activated cyclodextrin and adding the modified or activated cyclodextrin to a low molecular weight polyethylenimine to form a biodegradable copolymer (see example 25). Cheng anticipates the method comprising the formula II according to claim 3 wherein CD is a cyclodextrin, P is a monomer unit of a polymer, and D represents a therapeutic agent:



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17. Cheng teaches that the polymer can be polyethylenimine with a molecular weight of 25,000 (example 25), and that the copolymer (o) of formula II comprises 1-30,000 polymer units (claim 3). Cheng teaches that the cyclodextrin is beta-cyclodextrin (page 6, paragraph 0082) and is modified to allow conjugation (paragraph 0083). Cheng teaches that the copolymer can be treated with carbonyldiimidazole (beta-1,1'-carbonyldiimidazole) in order to add amine groups (page 30, paragraph 0309) which would result in a net positive charge. Cheng further teaches that the copolymer is conjugated via a carbonyl group (page 9, paragraph 0112), and the copolymer comprises ester bonds (claim 11). Furthermore, Cheng teaches that the copolymer compound comprises therapeutic agents such as nucleic acids (page 7, paragraph 0094). Thus Cheng teaches the claimed invention.

Conclusion

18. No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly A. Makar, Ph.D. whose telephone number is 571-272-4139. The examiner can normally be reached on 8AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Irem Yucel, Ph.D. can be reached on (571) 272-0781. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAM/11/08/06


DAVID GUZO
PRIMARY EXAMINER